PREPARATION OF CATALYSTS USEFUL IN THE PREPARATION OF PHENOL AND ITS DERIVATIVES

Abstract of Disclosure

A method and a catalyst are described for selective oxidation of aromatic compounds (e.g., benzene and its derivatives) into hydroxylated aromatic compounds (e.g., corresponding phenols). For example, benzene can be converted into phenol with a yield of at least 30-40%, and a selectivity on the basis of benzene of at least 95-97%. The selectivity for this reaction based on N_2O is at least 90-95%. Therefore, no substantial N_2O decomposition or consumption for complete benzene oxidation to $CO+CO_2$ or other side products occurs. Similar results are obtained with benzene derivatives (e.g., fluorobenzene, difluorobenzene, phenol), although the selectivity is somewhat lower in the case of derivatives (e.g., about 80-85% in the case of fluorosubstituted benzenes). A preferred catalyst for this process is a composition containing a high-silica pentasil-type zeolite (e.g., an HZSM-5 type zeolite) which contains no purposefully introduced additives such as transition or noble metals. The catalytic effect is achieved by performing a specific zeolite modification with strong Lewis acid-base centers of a specific nature. This modification can be achieved by a pretreatment comprising two steps: a first conventional calcination step at 300-600 °C, and a second high-temperature calcination step at 600 - 950 °C.